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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/827,280

04/05/2001

Cecilia Brandel

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05/26/2004

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EXAMINER

HARPER, V PAUL

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 05/26/2004

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/827,280	Applicant(s) BRANDEL ET AL.	
	Examiner V. Paul Harper	Art Unit 2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 4-6, 8, 9, and 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Krubsack et al. ("An Autocorrelation Pitch Detector and Voicing Decision with Confidence Measures Developed for Noise-Corrupted Speech," IEEE Transactions on Signal Processing, Vol. 39, No. 2, Feb. 1991), hereinafter referred to as Krubsack.

Regarding claims 1 and 8, Krubsack teaches a method for autocorrelation pitch detection using the following steps:

- dividing the speech signal into segments (p. 320, § "A. Pitch Detector," 1st paragraph);
- calculating for each segment a conformity function for the signal (p. 320, § "A. Pitch Detector," 1st paragraph, i.e., applying the autocorrelation function);
- detecting peaks in the conformity function (p. 320, column 2, 2nd paragraph, picking the peaks)
- estimating an average distance between said peaks (p. 320, column 2, F_0 is calculated as an average period length);

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- using the estimate of said average distance as an estimate of the pitch (p. 320, column 2).

Regarding claims 2 and 9, Krubsack teaches everything claimed, as applied above (see claims 1, and 8, respectively). In addition, Krubsack teaches:

- sampling the speech signal to obtain a series of samples (p. 320, § "A. Pitch Detector," 1st paragraph);
- performing said division into segments such that each segment has a fixed number of consecutive samples (p. 3, § "A. Pitch Detector," 1st paragraph, using successive 51.2 ms speech segments).

Regarding claims 4 and 11, Krubsack teaches everything claimed, as applied above (see claims 1 and 8, respectively). In addition, Krubsack teaches:

- said conformity function is calculated as an autocorrelation function (p. 320, § "A. Pitch Detector," 1st paragraph).

Regarding claims 5 and 12, Krubsack teaches everything claimed, as applied above (see claims 1 and 8, respectively). In addition, Krubsack teaches:

- calculating for each peak in the conformity function the difference between the position of the peak and the estimate of said average distance (p. 320, column 2, equation 3);

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- providing an estimate of the pitch by selecting as the improved estimate the position of the peak having the smallest value of said difference (p. 320, column 2, equation 3 and following text).

Regarding claims 6 and 13, Krubsack teaches everything claimed, as applied above (see claims 5 and 13). In addition, Krubsack teaches:

- selecting, if the peak having the smallest value of said difference is represented by a number of samples, the sample having the maximum amplitude of said conformity function as said improved estimate of the pitch (p. 320, column 2, in particular ¶3, peak size).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krubsack in view of Rabiner et al. ("Digital Processing of Speech Signals," Prentice-Hall, 1978), hereinafter referred to as Rabiner.

Regarding claims 3 and 10, Krubsack does not specifically teach: "estimating a set of filter parameters using linear predictive analysis, providing a modified signal by filtering the speech signal through a filter based on said estimated set of filter

parameters, and calculating said conformity function of the modified signal." However, the examiner contends that this concept was well known in the art, as taught by Rabiner.

In the same field of endeavor, Rabiner teaches a technique for pitch detection using LPC parameters with the steps of estimating filter coefficients, filtering and autocorrelation (Fig. 8.25, §8.10.1, in particular the first two paragraphs).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krubsack by specifically providing the method, as taught by Rabiner, since the resulting filtering flattens the spectrum (p. 448, 1st paragraph) improving the results.

3. Claims 7, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krubsack in view of well known prior art (MPEP 2144.03).

Regarding claims 7 and 14, Krubsack does not specifically teach that "said method is used in a mobile telephone." However, the examiner takes official notice of the fact that the use of pitch extraction techniques in a mobile telephone for the processing of speech was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krubsack such that the pitch detection technique was applied to mobile telephones, since improved pitch extraction can be used to improve the speech processing techniques used in mobile phones.

Regarding claim 15, Krubsack does not specifically teach "the device is an integrated circuit." However, the examiner takes official notice of the fact the implementation of signal processing algorithms on integrated circuits was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Krubsack such that the pitch detection technique was implemented in an integrated circuit, since implementation of the algorithm in hardware can improve performance.

Response to Arguments

4. Applicant's arguments filed 4/19/04 have been fully considered but they are not persuasive.

5. Applicant asserts on page 1:

It is asserted that F_0 , calculated in Krubsack as "the average period length of all of the pitch periods that are at least 50% within the analysis window", is analogous to "estimating an average distance between said peaks" as recited in claims 1 and 8. See Office Action, page 3 and Krubsack, pg. 320, second column, lines 38--40. Applicants respectfully disagree.

Krubsack teaches that the term "period", as used therein, refers to "the first estimate of the pitch period." See Krubsack, pg. 320, column 2, lines 8-10. It can be seen from Krubsack that the term "period" refers to the actual lag or position of a given peak, *and not to any distance between peaks*. As such, the period of Krubsack does not refer to an average distance between peaks as recited in claims 1 and 8. Applicants respectfully submit that claims 1 and 8 distinguish over Krubsack and request that the § 102 rejection of claims 1 and 8 be withdrawn. (Italics added)

With an autocorrelation function of a periodic signal (e.g., voiced speech) there is an initial peak at a lag of zero. Krubsack uses an autocorrelation technique and teaches the use of a peak picking algorithm that chooses the maximum peak within the window 3 to 20 ms after the lag 0 value to calculate the first estimate of the pitch period (i.e., the difference in time between the lag 0 peak and the maximum peak in the 3 to 20 ms window is a pitch period estimate) (pg. 320, col. 2). The pitch periods thus calculated are then averaged to determine F_{0a} (the actual pitch) (pg 320, col. 2, lines 38-40). The examiner maintains that these steps correspond to the steps of “detecting peaks in the conformity function”, “estimating an average distance between said peaks” and “using the estimate of said average distance as an estimate of the pitch” (limitations in claim 1).

Furthermore, applicant's failure to adequately traverse the examiner's taking of Official Notice in the rejections of claims 7, 14 and 15 in the last office action is taken as an admission of the facts noticed.

Citation of Pertinent Art

6. The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

Rabiner et al. (“Digital Signal Processing of Speech Signals” previously referenced) further notes the periodicity of local peaks in an autocorrelation function and indicates the average pitch period based on those peaks (p. 144, lines 9-12).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

or faxed to:

(703) 872-9314

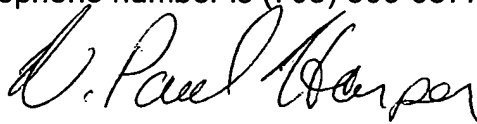
Hand-delivered responses should be brought to:

Crystal Park II
2121 Crystal Drive
Arlington, VA.
Sixth Floor (Receptionist)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. V. Paul Harper whose telephone number is (703) 305-4197. The examiner can normally be reached on Monday through Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (703) 305-9645. The fax phone number for the Technology Center 2600 is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service office whose telephone number is (703) 306-0377.



VPH/vph
May 17, 2004



RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER